Carlsbad 1652.

Carlsbad as seen from the Franz Joseph's Hill.

Stiepel Brouthers, Reichenberg.

CARLSBAD

its

SPRINGS AND SPRING-PRODUCTS.

Published by order of the Local Authority

by

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CARLSBAD

1895.

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CARLSBAD, the Queen of European Spas situated in the German portion of the Austrian Empire, in the north-western corner of Bohemia, at 50° 13' 11" Lat. north, 12° 53' 19" Long. east of Greenwich, and 1,227 feet (English) above the sea level, lies in a romantic valley, surrounded by high hills, which are covered with a rich growth of fir, pine, oak, and beech, of peculiarly luxuriant vegetation, and are remarkable for the varied and picturesque views which they present. Thanks to the purifying influence of the forest, the atmosphere is healthy and bracing. The climate otherwise differs in no respect from that which prevails generally in the central portion of Germany. The average temperature throughout the year is 7,60° Celsius (45,7° F.) and throughout the season 14,4° C. (57,2° F.), and the average reading of the barometer is 728 millimetres. The town rises in terraces on both banks of a small river, called the Tepl.

Carlsbad has been free from epidemic diseases practically from time immemorial. None of the plagues which have at intervals devastated the rest of Bohemia have ever touched it. For centuries it has been reputed exceptionally salubrious.

Carlsbad has about 13.000 resident inhabitants. The number of patients annually visiting the place

for the use of the waters amounts to something like 39.000, not including casual visitors and tourists. Of the patients between about 1000 on an average hail from the United Kingdom, and the double number from the United States of America.

The *Carlsbad Hills*, facing the "Erzgebirge" (ore-mountains), and joining on the "Boehmerwald" (Bohemian Forest) in the south, form, together with the mountain-chains just named, and the "Fichtelgebirge", geologically one great system of rocks. They consist mainly of ridges of granite — a continuation of the Saxo-Bohemian granite — overlaid with strata of gneiss, mica schist, and clay slate. This granite comprises the older coarse-grained granite (the so-called "Carlsbad granite"), and the large-grained granite, which seems to occur here in "druses". The Carlsbad Hills attained their present elevation only in the tertiary period, the period of basalt-eruptions — and it was in this period also that the Carlsbad waters forced their way upwards. The volcanic revolutions caused basalt-eruptions, by means of which a channel was mined for the springs. In this manner the older masses of rock came to be split up in various directions, and the basalt masses broke through the clefts, partly but not wholly, filling them up. Wherever they failed so to fill them, a passage was left through which the springs rose to the surface. The direction taken by these clefts in the lower depths corresponds in the main with the line of hollows in the Tepl Valley. One of these forms the depression in which lie the Prague Road on the right bank of the river, and the "Schlossberg" on the left. Another forms the channel of the river. At the point where the two hollows cross, the central spring of Carlsbad —

the Sprudel — comes to the surface. The other springs rise from lateral clefts, which are in communication with the Sprudel. As regards the origin of the Sprudel, modern geologists (Professor Hochstetter among others) suggest the following explanation: the surface water, passing downwards, becomes charged with carbonic acid, which is absorbed from the soil, and which enables the water to retain in solution the granitic constituents met with in the Carlsbad water, and this in the larger proportion the greater is the depth of the place where the water accumulates. We know that the temperature of the earth, after passing below the topmost strata, increases in the ratio of about one degree F. to every fifty feet of additional depth. Hence we are in a position to estimate the main basin of Carlsbad waters to be about 8.000 feet below the surface. The difference observable in the temperature of various springs is easly accounted for by the differences in the distance which the various springs have to travel on their way upward, and the differences in the length of time occupied in the process. All hot springs possess the property of *incrustation*, that is, they incrust objects with the minerals which they hold in solution, such as lime, silicates, manganese, iron, etc. This process takes place in the Sprudel spring, and in this way the latter has in the course of time built up by slow degrees a cylinder or shell composed of its earthy ingredients, and incrusting the walls of the capacious subterranean caverns through which it flows. This shell goes by the name of "Sprudelschale". The "Sprudelschale" has formed a vast number of vaults or caverns, one rising above the other, or extending side by side. It rests upon the solid granite below.

The caverns referred to communicate with one another by lateral channels. In these the waters accumulate, and so does the carbonic acid, forming large or small bubbles. Whenever the carbonic acid manages to overcome the pressure of the column of water which confines it, the water and the gas break forth simultaneously, and this is the reason why the Sprudel spurts out, as it does, in its own peculiar way, in jets. The Sprudel shell has a thickness of about 60 to 120 centimetres (20 to 40 inches), and stretches out a considerable distance beneath the surface of the earth and of the Tepl River. Whenever the Sprudel water finds its flow hindered by mechanical obstructions — for instance, by deposits accumulated in its channels — it bursts forth with some violence, breaking through the shell, and thus creating for itself a new outlet. This process is called a Sprudel eruption. The most violent eruptions of this kind in the past — some of which have caused much damage—took place in the years 1617 and 1620, in 1713, 1727, 1766, 1788, 1798, and again in 1800, 1809, and 1834. In order to guard against their repetition the openings of the Sprudel are now periodically widened and cleared of the shell deposited, by boring to the bottom. The bore-holes thus created, being opened and closed as occasion requires, are used as safety valves. Pieces of the Sprudel shell, passing by the name of "Sprudelstein" cut and polished, form a favourite article of commerce — like the wellknown Carlsbad incrustations — and their manufacture and sale provides employment for a not inconsiderable number of persons in the locality.

There is a tradition, as at many other watering-places, about an animal leading to the discovery of the spring, on the occasion of a hunting excursion

of the German Emperor Charles the Fourth. But it has been clearly proved that Carlsbad was already known in the twelfth century. The authentic history of Carlsbad begins in the fourteenth century, and the oldest document relating to the place, a deed of feoffment, still extant, is dated as early as the year 1327. However, both legend and history agree in naming Charles IV. as the founder of the watering-place of Carlsbad.

Passing on from Carlsbad historical to Carlsbad present and Carlsbad medicinal, it should be stated that the regular season begins annually on the 1 st of May, and extends to the 1 st of October. But as there is no difference in the medicinal effect of the waters all the year through, they may be taken with benefit at any time, and, in fact, visitors are found here at all seasons. Lodgings are always to be had, and entertainments for amusement are provided at all periods of the year.

There is *direct railway communication* with all parts of the Continent. Carlsbad itself is a station on the "Buschtiehrad" Railway line (North-Western Railway of Bohemia). The journey to Carlsbad takes: From Berlin 9 hours, from Bremen 21, from Breslau $14^{3}/_{4}$, from Budapest 18, from Dresden 5, from Frankfurt o. M. 10, from Frankfurt o. O. 14, from Hamburgh $18^{1}/_{2}$, from Hanover 16, from Cassel 18, from Cologne $17^{1}/_{4}$, from Königsberg $22^{1}/_{2}$, from Leipzig 8, from Lemberg 30, from Magdeburg $12^{1}/_{2}$, from Munich 8, from Paris 29, from Prague $4^{1}/_{2}$, from Stettin 15, from Stuttgart $11^{1}/_{2}$, from Strasburg 16, from Warsaw 30, from Vienna 8, from Trieste 27 hours.

Every visitor who makes a longer stay than eight days in Carlsbad, whether taking the waters

or not, is required to pay the local tax (called the "Kurtaxe"). With regard to this tax, the visitors are divided into four classes. The tax amounts to ten gulden for a person of the first class, to six gulden for a person of the second class, and four gulden for a person of the third class. The fourth class comprises children under 14 and servants, who are only charged one gulden a head. A subscription for maintaining the band is levied in proportion to the Kurtaxe. For further information visitors are referred to

Restaurant in the Town Park.

the "Amtliche Nachrichten zur Kurliste" an official publication (price 30 kreutzers). Payment of the taxes mentioned entitles the payer to free admission, during however long a stay, to all springs, parks and promenades, and afternoon and evening concerts arranged by the authorities of the town. Medical men pay only the subscription for the band, and are entitled to free admission to the baths and reading-rooms.

The *town band* ("Kur-Kapelle") plays during the season in both the Sprudel- and the Mühlbrunn-

colonnades every morning from six to eight (the usual hours for drinking). There are afternoon-concerts from 4 to 6 on Sundays in the "Stadtpark", on Tuesdays and Thursdays in Pupp's Garden, and also evening concerts from 7.30 to 9 on Mondays and Fridays at "the Stadtpark", and on Wednesdays until end of August at Pupp's Garden, after August in the Curhaus. All these are "open-air concerts" — "weather permitting". Visitors having a fancy for classical music, symphonies, etc. will greatly relish the far-famed *entrée* concerts (concerts at which 50 kreutzers is charged for admission) conducted by Herr Labitzky. There is scarcely a piece of classical music of any recognized merit which does not figure on the programme at some concert during the season.

There are plenty of *hotels* at Carlsbad, all comfortably furnished, for instance: Hotel Anger, Bayrischer Hof, Bristol, British, Continental, Donau, Erzherzog Carl, Drei Fasanen, Fassmann, Fleischmann, Glattauer, Stadt Hannover, Hopfenstock, Kaiserbad, Königsvilla (pension), Loib, Lyon, Monopol, Morgenstern, National, Oesterreichischer Hof, Paradies, Post, Pupp's establishment, Russie, Goldener Schild and others. Lodgings can be obtained in these hotels on the same terms as in private houses, leaving the visitor (called "Kurgast") free to take his meals wherever he likes. There are private lodging-houses also affording good accommodation and ample attendance. The prices asked are pretty much the same as those charged in other watering-places, and of course they vary according to situation and season. During the past few years the town has grown very rapidly, and it still continues to grow. At the present time it numbers considerably above 1000 houses. This supply of room

practically ensures that lodgings are always to be had, at all seasons of the year, and there is no occasion for visitors to fear that they will find themselves without accommodation. Those who wish to secure apartments of more than ordinary pretensions or rooms in a particular street, during the height of the season (in June and July), will do well to write betimes either to the landlord or to friends, or else to the medical man to whom they are directed. Rent is charged from the day that the lodging is engaged. Visitors coming to Carlsbad for the first time and not having previously engaged rooms, or visitors arriving late in the afternoon, will do best to put up at an hotel for the first night. Otherwise they run the risk of being entrapped by lodging-house touts who, under the pretence that all available lodgings are taken, may lead them to the most inconvenient or the most expensive part of the town. In such cases, even should the visitor discover his mistake and give immediate notice to vacate the apartments, he will find himself required by the law to pay a full week's rent. There are special regulations for the letting of apartments (called "Miethordnung") approved by the Government, which visitors will do well to consult, so as to avoid disputes with their landlords. These regulations must, on demand, be produced for inspection in every hotel as well as in every private house. Any person writing for lodgings has a right to ask that the "Miethordnung" be sent him for perusal. In hotels agreements may be made by the day. Any disputes arising between visitors and lodging-house-keepers should be referred to the Local Government Commissioner (K. K. Bezirkshauptmannschaft, 578, Neue Wiese, 2 nd floor), who may also be consulted

respecting the charges of cabmen or any difficulties arising from the hire of public vehicles. All other disputes having the nature of a lawsuit should be laid before the Local Law Court (K. K. Bezirksgericht, in the same building, 1 st floor).

The following *provincial authorities*, besides those already mentioned, have their official residence in Carlsbad, viz., the Chief Commissioner of Customs (Hauptzollamt) the director of Posts and Telegraphs, and the superintendent of the military bathing-house.

The *local municipal authority* consists of the Mayor "*Bürgermeister*" and the *town council.* The former, being elected by the community, constitutes the highest local authority in the town, and exercises control over all matters of a municipal character as well as those concerning the locality as a watering-place. All complaints respecting matters of local and personal administration, or arrangements in the local establishments, baths, etc., should be submitted to the Mayor in the Town Hall (Stadthaus) within the hours appointed for the consideration of such cases, viz., daily between 9.30 and 10.30 a. m. (the Town Hall situated in the Muehlbadgasse 20).

The municipal *Police Station* is situated in the "Stadthaus", on the 2 nd floor, in room Nr. 5. Here notice respecting property lost or found should be given.

Churches. — Carlsbad possesses a Roman Catholic Church, a Lutheran Church, an Eastern-Orthodox (Russian) Church, an English Church, and a Jewish Synagogue. In all these places there is regular service during the entire season.

The *Stranger's Hospital* during the time of 1st of May to the 21st of September accomodates four

1. Protestant Church. 2. English Church.
3. Roman Catholic Church.
4. Russian Church. 5. Synagogue.

times 50 poor patients — each patient being allowed to remain four weeks; part of these are admitted without any charge being made, the others pay at a very moderate rate merely to cover the cost of board. There are besides 11 beds to be paid for at the disposal of very sick patients who are in want of the greatest care, and such patients have to pay according to the accomodation they ask for.

The *Jewish Hospital* admits 36 poor patients each month during the season, all beds being free. Applications for admission should be addressed to the Superintendent, at Prague, before the 1 st of March in each year.

A *Charitable Institution*, called "Elisabeth Rosen-Stiftung", is deserving of notice as being of great benefit to visitors of very limited means. It was founded by public subscription, Frau Arnemann being the principal contributor, and is supported by the voluntary contributions of charitable visitors. From the fund thus formed every patient approved receives a grant of 30 fl. towards rent of lodgings and general expenses of his stay. In addition the Town Council allow him exemption from both the "Kur-" and "Musik-taxe", and free admission to the baths. Medical treatment is given gratis by doctors who are members of the managing committee of the Fund. According to the regulations of the Institution these privileges are granted, as a rule, only twice to the same person, and in no case oftener than three times. Patients of straitened means belonging to the educated classes, no matter what be their nationality, or religion, are eligible for the benefits of the "Elisabeth Rosen-Stiftung". They should apply to the Burgo-

master of Carlsbad, enclosing a certificate from a properly certificated medical man.

The *Military Bathing House* and the officers' bathing house between them admit 62 officers and 44 non-commissioned officers and private soldiers at a time during the season, each admission being for four weeks.

The *Reading Rooms* (with smoking-room and ladies' room attached) are situated on the first floor of the Curhaus. One hundred and twenty different

Municipal Theatre.

newspapers and periodicals in all modern languages are kept here. Tickets of admission are sold on the ground-floor (side entrance). The fee is 15 kr. a day, 70 kr. a week, 2 fl. a month.

The *Municipal Theatre* (the miniature model of the new opera house at Odessa, and erected in 1885-6 according to the design of the wellknown architects Messrs. Fellner and Hellmer, of Vienna) is magnificently fitted up, well ventilated and lighted,

by electricity. Performances take place every evening from the middle of April to the end of September (at half-past six p. m.). The performances consist mainly of light operas and comedies or burlesques of the better class.

In the "*Municipal Kurhaus*" dancing reunions take place every Saturday. For these no special invitations or introductions are required, every person who pays the entrance fee beeing admitted.

Kurhaus.

Cabs and Omnibusses.

Omnibus from the railway station to the town: Fare 40 kr.

Light articles of luggage taken into the 'bus have not to be paid for.

Cabs from the railway station to the town:

1 horse conveyance (Droschke) 1 fl. 10 kr.
2 „ „ (Fiaker) 1 „ 80 „

Luggage placed on the driver's seat or on the

back of the carriage is charged
at the rate of 30 kr. for the Droschke
50 „ „ „ Fiaker

Franz Joseph's Hill.

Aberg.

Hirschensprung.

Stefaniewarte.

From 9 P. M. to 6 A. M. the above charges are to be increased by half.

Mühlbrunn-Colonnade.

Sprudel-Colonnade.

Interior of the Sprudel-Colonnade.

For *special Cab Regulations*, Charges for Riding and Driving Donkeys, for Commissionaires and porters see "Amtliche Nachrichten zur Kurliste" (30 kr.).

Pedestrians will enjoy the shady walks and promenades (their length being about 100 Kilometres) through the woods and on the mountains; they offer plenty of variety and beautiful scenery and are well provided with seats. Here we mention only the very convenient walks to the Franz Joseph's Hill, Hirschensprung, Dreikreuzberg, Stefanie-Warte and Aberg.

The *peculiar remedies of Carlsbad* are its springs and the preparations made from them, which are used both for drinking and bathing. The *history* of the Carlsbad "Kur", or course of baths and waters, may be divided into four periods. During the first (until 1522) Carlsbad already enjoyed a wide reputation as a watering-place, and had a church of its own, a town hall, and about 40 houses. The Sprudel was then used only for bathing. The patients remained in the bath until the skin became actually sore, and the term "Hautfresskur" (flaying-baths) was derived from this barbarous method of using the waters. (This custom, however, prevailed at those times at all watering-places where there were hot springs.) About the year 1766 bathing became unpopular, and was for a time entirely given up. In its place there grew up a craze for excessive drinking, the patients being made to swallow from 50 to 70 cups a day. In this period the following springs were known and used: The Sprudel, the Muehlbrunn (millspring), the Gartenbrunn, subsequently christened Theresienbrunn, and the Neubrunn (new spring). The first bathing establishement was erected in 1704, and also the first pump room at the Neubrunn. After

various changes the present Muehlbrunn-Colonnade, a fine structure, was built between 1872 and 1878 at a cost of upwards of £ 60000. Until 1827 the Sprudel spring was left open in an uncovered promenade: after that is was covered in with a wooden portico which, in 1879, was superseded by the modern magnificent hall, constructed of iron and glass.

The first written *Visitor's List* ("Kurliste") still extant dates from the year 1756, giving the names of 134 families. The first printed list appeared 40 years later, comprising 638 visitors, who used the

Schlossbrunn.

"Kur" during the season of 1795. Among the visitors of Carlsbad during the last centuries we find the following names: Philippine Welser, with her husband Ferdinand, Archduke of the Tyrol (1571 and 1575); Wallenstein (1630); the extravagant Prince-Elector of Saxony, Augustus, King of Poland (1691); Peter the Great, Czar of Russia (1711 and 1712); Elizabeth, Empress of Austria, the wife of Charles the Sixth, with her daughter, Maria Theresia; Joseph the Second, Emperor of Austria; the Prussian kings, Frederick the First and Frederick William the First (1732) more-

Sprudel.

over Leibnitz (1712), Gellert, Laudon and others. Later on we find Goethe (14 seasons), Schiller, who spent his honeymoon at Carlsbad, Fichte, Körner and the immortal Beethoven, who gratified the public by playing a free fantasia at a charity concert; also the Prussian Field Marshal General Blücher, the famous "General Vorwärts" of the great war of liberation 1813—15, etc.

The third period in the history of the Carlsbad "Kur", which may be called the rational one, sets in at the end of the last century. Although as a watering-place Carlsbad was well known, and had enjoyed a high reputation for over two centuries, and although the waters were then already exported to very distant places, yet they had never been chemically analysed. The first analysis was made in 1789, by the Carlsbad physician, Dr. David Becher. Many analyses have been made since by the most eminent chemists (such as Berzelius, Steinmann, Wolff, etc.), and they all agree entirely in the principal points, in respect of which they are supported by the latest analyses made by Professors Ludwig and Mauthner of the Vienna University. The differences observable are exceedingly slight, and may easily be accounted for by the modern, more sensitive methods of investigation. These analyses all show that since the first inquiry was made, a century ago, the waters have remained unchanged in both their quantitative and their qualitative composition and also that the Sprudel has not altered its temperature. Besides the springs previously mentioned as having been analysed by Becher, there are the following waters to be noted: Bernhardsbrunn (1784), Schlossbrunn (1874), Hygiea spring (another opening of the Sprudel, the excessive carbonic acid of which is employed to saturate the

salts prepared at the salt-works thus reconverting them into bicarbonates), moreover Marktbrunn, Felsenquelle (1844), the Russian Crown-spring, the Eisenquelle (Chalybeate spring, at the Wiesenthal about ten minutes walk from the former), the Kaiserbrunn, the Crown-Princess Stefanie spring (1887); all, except the Hygiea, are situated on the left bank of the river.

At the period referred to, about a century ago, a very strong protest was raised against excessive drinking at all watering-places, and Becher, as able a practicioner as he was a learned man of science, insisted on limiting the quantity of water taken, and advised bathing as an essential part of the treatment, recommending the patients to drink at the spring, and thus establishing in its main features the method as now generally practised.

The *Carlsbad treatment* is a combination of internal and external use of the thermal waters, supported by a diet designed to assist the effect of the waters, the special ailment and the individuality of the patient being fully taken into account in the application of all hygienic factors, such as exercise. The absence from home, from business and care and occupation is, of course as in other similar forms of treatment, of very material importance.

Carlsbad is the main representative of the alkalo saline mineral waters, *i. e.*, of waters which, in addition to carbonic acid and alkaline salts contain a considerable proportion of sulphate of soda. The springs vary in temperature from 27° R. to 58° R. or 33·9° C. to 72·5° C., or 93 deg. F. to 163 deg. F. (1 deg. Celsius [Centigrade] = $^4/_5$ deg. Réaumur = $^9/_5$ ± 32 deg. Fahrenheit).

TEMPERATURE OF THE SPRINGS.

Sprudel	58·0 deg. R.	= 72·5 deg. C.	= 162·5 deg. F.
Kurhausquelle . . .	51·0	= 63·7	= 146·7
Bernhardsbrunn . .	48·5	= 60·7	= 141·2
Felsenquelle	47·8	= 59·7	= 139·5
Neubrunn	47·2	= 59·0	= 138·2
Theresienbrunn . . .	46·2	= 57·7	= 135·8
Schlossbrunn	39·2	= 49·0	= 120·2
Kaiserbrunn	38·8	= 48 5	= 119·3
Muehlbrunn	38·4	= 48·0	= 118·4
Russische Krone . .	36·4	= 45·5	= 113·9
Marktbrunn	32·8	= 41·0	= 105·8
Elisabethquelle . . .	32·5	= 40·7	= 105·2
Parkquelle	32·2	= 40·2	= 104·4
Kaiser Karl-Quelle .	31·5	= 39·4	= 102·9
Hochberger Quelle .	31·5	= 39·4	= 102·9
Spitalbrunnen . . .	28·2	= 35·2	= 95·3

The Carlsbad waters are quite clear and free from colour, generally speaking, very palatable, with a faint saline taste, but without any characteristic smell. They never, from the very first cause the slightest distaste or nausea. The waters, as such, never give rise to congestions.

The Carlsbad waters act:

1. By immediate contact with the mucous membrane of the stomach and alimentary canal, allaying pain and spasms in these organs, and stimulating the digestive organs into activity.
2. Through the blood. That is, they change its condition by increasing the proportion of alkali in the blood as well as in all derivative secretions (gall, urine, etc.)

The congestions so much dreaded, which we hear of now and then, are not among the effects of a course of Carlsbad waters rationally pursued, and only trouble persons predisposed to them, who, re-

ANALYSIS OF THE CARLSBAD MINERAL WATERS.

Made in 1879 by Prof. Dr. Ernst Ludwig of Vienna.

10,000 grammes of the Water contain	Sprudel	Markt-Brunnen	Schloss-Brunnen	Mühl-Brunnen	Neu-Brunnen	Theresien-Brunnen	Elisabeth-Quelle	Felsen-Quelle	Kaiser-Brunnen
Carbonate of protoxide of iron	0·030	0·006	0·001	0.028	0·026	0·017	0 026	0·026	0·029
Carbonate of protoxide of manganese	0·002	0·002	Traces			0·002	0·002	0·002	0·002
Carbonate of magnesia	1·665	1·634	1·615	1·613	1·592	1·577	1·642	1·615	1·602
Carbonate of lime	3·214	3·350	3·337	3·266	3·287	3·277	3·273	3·293	3·173
Carbonate of strontia	0·004	0·004	0·004	0·004	0·004	0·003	0·004	0·003	0·004
Carbonate of lithia	0·123	0·123	0·136	0·118	0·113	0·113	0·121	0·116	0·121
Carbonate of soda	12·980	12·705	12·279	12·790	12·910	12.624	12·799	12·836	12·674
Sulphate of potash	1·862	1·814	1·930	1.888	1·893	1·905	1·840	1·803	1·796
Sulphate of soda	24·053	23·860	23·158	23·911	23·654	23·774	23·769	23·785	23·411
Chloride of sodium	10·418	10·304	10·047	10·288	10·309	10·278	10·314	10·314	10·103
Fluoride of sodium	0 051	0·051	0·046	0·046	0·046	0·046	0·057	0·060	0·053
Borate of soda	0·040	0·040	0·039	0·029	0·036	0·036	0·030	0·036	0·056
Phosphate of lime	0·007	0·007	0·004	0·009	0·004	0·009	0·007	0·007	0·007
Oxide of aluminium	0·004	0·007	0·005	0·005	0·006	0·005	0·006	0·003	0·005
Silicic acid	0·715	0·712	0·703	0·735	0·709	0·718	0·724	0·707	0·729
Carbonic acid, half combined	7·761	7·681	7·493	7·672	7·627	0·584	7·697	7·704	7·581
Carbonic acid, free	1·898	5·557	5·822	5·169	4·372	5·100	6·085	4·653	5·641
Caesium, rubidium									
Bromine, iodine									
Arsenic, antimony				Traces					
Zinc, thallium									
Selenium									
Formic acid									
Specific gravity	1·0053	1·00537	1·00522	1·00532	1·00534	1·00537	1·00539	1·0054	1·00537

gardless of frequent warnings, indulge in too active exercise of free living. All sudden deaths which have occurred at Carlsbad have been proved by *post-mortem* examination (which is obligatory, by law, in every instance) to have been due to old-standing disease of the heart, apoplexy, or disease of the arteries—complaints which would have carried off the patient suddenly in any place, and were in no way aggravated by use of the waters. Experience has tought medical men that patients affected with these ailments are not fit to take the waters of Carlsbad, or of any watering-place. Carlsbad enjoys as a watering-place so well-merited a reputation for its curative effects, and is so entirely independent of fashion, moreover, the number of visitors gathering here annually so far exceeds that frequenting any other watering-place, that there is really no need to meet with arguments assertions which are amply disproved by facts. As to its being a dangerous place, the dread of Carlsbad is only entertained by those who know very little about the place, and about the effect of its mineral waters.

Carlsbad does not, of course, provide a universal remedy for all ailments — for there is no such thing as a panacea — but, when properly used, it is a safe remedy for a large number of physical disorders, and its waters have exhibited a potency for good which exceeds anything that other mineral waters can boast of. The congestions of which people are so much afraid, do not arise in any way from the rational use of the waters; and the "Draconic dietary rules, which, if neglected, are followed by so severe punishments", are a mere myth, as every book on Carlsbad proves. A diet is simply

prescribed with regard to the disease and the purpose for which the cure is sought, just as would be the case when taking any other remedy. As to the nonsensical phrase occasionally heard, "the patient is not yet ripe for Carlsbad", or "it is too soon to go to Carlsbad", as though it were desirable that the disease should grow to maturity in the system, one cannot answer it better than by quoting the famous remark of the great Oppolzer: — "That senseless idea, 'too soon for Carlsbad', resolves itself often, into 'too late for the patients', who, after having been kept in suspence for years, and weakened and exhausted by all possible and impossible manners of treatment, are finally sent to Carlsbad in a stage of the disease in which — suppose the best of cases — the patients, if at all restored will need years to recover, while that result might have been obtained immediately, with certainty, if the treatment had been judiciously insisted upon at the beginning of the disease, when the sick man was warned against Carlsbad as "not being yet ripe for it".

The Carlsbad waters are indicated, according to the judgment of the best accepted clinical authorities — amongst whom some of the moderns are cited below — and the experiences collected in many years' practice by the Carlsbad physicians and authors of medical treatises:

1. In diseases of the *stomach*, such as chronic gastric catarrh, cardialgia (heartburn), ulcer of the stomach, dyspepsia, widening of the stomach (Prof. Ziemssen, Germain Sée, Lebert, Leube, Ewald, Boas, etc.).

2. In diseases of the *intestines*, such as chronic catarrh, chronic diarrhoea, habitual constipation ulcer of the duodenum, haemorrhoids (Schoenlein, Oppolzer, Lebert, Dietel, Jacksch, Ewald, Zizurin, Walter, etc.).

3. In diseases of the *spleen* — Chronic hyperaemia, tumours (after ague, etc., an illness which affects those living in marshy districts and in hot climates). The physicians in Hungary, and even to a greater degree the Dutch physicians practising in India (where malaria and intermittent fever are so common) direct their patients with preference to Carlsbad.

4. In diseases of the *liver* — Hyperemia arising from abdominal plethora, fatty degeneration of (and apposition in) the liver, sluggish liver, the curable forms of jaundice, hypertrophy, if not connected with disorder of the lungs or heart, amyloid liver, gallstones. There is no work on liver diseases, whatever may be the language in which it is written, which does not devote a prominent place among curative agencies to Carlsbad. Among modern books we may cite Frerichs' celebrated monograph on liver complaints, and the works of Oppolzer, Bamberger, Ducheck, Fiedler, Strümpell and others, on the same subject.

5. In diseases of the *kidney and urinary organs* — Chronic catarrh, renal and vesical gravel and calculi, etc. Carlsbad has long been used for after-treatment following upon surgical operations for stone (amongst others by the following celebrated specialists: Civial, Langenbeck, Wilms, Ivanitsch; also for albuminuria, but not when it is the secondary result of an illness, in which case Carlsbad is contraindicated.

6. In diseases of the *prostate gland* — Chronic hyperaemia arising from abdominal plethora or hypertrophy of the gland.

7. In diseases of the *womb* — Chronic catarrh chronic infarction, and all affections of that organ

which result from abdominal plethora (Hennoch, Dittel, Frerichs, Wilms, Scanzoni, Braun, Spaet, Lumbe, Bartsch, Martin, Saexinger and others).

8. In *gout*, general *adiposity*, *abdominal plethora*, *diabetes mellitus*. Persons suffering from diabetes come from all parts of the world. On this point we may appeal to the authority of the Carlsbad physicians, whose conclusions have, on account of the enormous range of their observations, been cited in all treatises on diabetes as proofs of the benefits derived from the waters, *e. g.*, in the special treatises on diabetes by Voigt, Cantani, Durand-Fardell, Senator, Stockvis. Some of these observations have become leading cases, and have opened new views on the theory of diabetes *e. g.*, "Observations on the Use of Carlsbad Waters in Diabetes", by Fleckles sen. (1842), which was followed by 14 other treatises; Seegen, whose monograph on diabetes is admitted to have been a most valuable contribution to the literature on that specific disease; Fleckles jun., who first wrote a monograph on the diabetic regimen. Frerichs' last work on "Diabetes" is actually an apotheosis of the use of Carlsbad in respect of this complaint, and so is Prof. Ebstein's new work, "Theory and Practice of Diabetes Mellitus" (1887).

The Carlsbad Mineral Waters regulating and promoting the evacuations exercise a considerable influence on all classes of diseases originating in stagnation of blood in the bowels (if such stagnation is not the consequence of any changing in the blood-vessel's apparatus, etc.).

The *quantity* of the mineral waters to be taken varies, generally speaking, from two to six cups

(ten to thirty ounces) a day. More is rarely advisable and often much less is sufficient. Occasionally the Carlsbad Sprudel salt (also milk or whey) are added to the water. They can be obtained at the springs. All such natural mineral waters as are bottled for exportation (both foreign and native) are kept in stock at Carlsbad, and may be obtained in single bottles newly filled, at the shops. In this way persons accompanying their friends, but not desiring themselves to take the Carlsbad waters, are enabled to take any other mineral water while using only the baths of the place. The *baths* can be taken in the bathing establishments belonging to the town, which are fitted up with every comfort and convenience. The bathing establishments are:

The Kurhaus with:
Mineral water baths; Mud baths; vapor baths; douches and common water baths.

The Neubad with:
Sprudelwater baths; Mud baths.

The Sprudelbad with:
Sprudelwater baths.

The Kaiserbad with:
Thermal and common water baths; vapor baths for single persons; Baths for the cold water treatment and shower baths; electric baths; massage and swedish medical gymnastics (Prof. Zander's method).

This bathing establishment opened in 1895 is doubtedless the most elegant and perfect establishment in Europe.

Chalybeate baths in the Wiesenthal, the Sauerbrunn bath ("Gasbäder") in the Dorotheen-Au and the Swimming School (in the River Eger,

The Kaiserbad.

into which the Tepl flows). The mud used for the Mud-baths is taken from the extensive Iron Moorfields at Franzensbad, belonging to the Municipality of Carlsbad. Any additional ingredients which may be desired may be had in the bathing establishments.

The Export of Carlsbad water and Carlsbad salts is a practise of comparatively recent origin. Up to 1843 such were scarcely heard of. There are, indeed, cases on record of its supply to favored persons before the date named. But these cases were altogether exceptional and dependent altogether upon the grace of the imperial Court, which gave the requisite permission in every instance as a special boon. About 1843, when the analyses prepared by chemists of such recognized standing as professors Berzelius of Stockholm, H. Rose of Berlin, Pleischl and Redtenbacher of Vienna, had shown that the waters maintain a steady and unvarying composition — and after practical experiments and prolonged observations instituted by medical men of such high repute as professors Oppolzer, Skoda, Schroff of Vienna, Löschner of Prague and others, had proved the exported water to be of signal medicinal efficacy, Dr. Hlawaczek appealed to the imperial government to allow the water to be sent abroad in the regular course of trade, and after repeated exertions he was successful, thus securing an appreciable benefit for suffering humanity, for which he is unquestionably entitled to credit.*)

*) The authorized exportation of the Carlsbad mineral waters was introduced in 1844, at the instance of Dr. E. Hlavaček, and was then first let out to T. A. Hecht for 500 fl. per annum. Then it was put up for auction and granted to Seifert and Damm for

1. Waters Exportinghouse. 2. Bottling Sprudelwater. 3. Bottling Mühlbrunn. 4. Bottle-Cleaning. 5. Packing.

Exportation being permitted, the local authorities took the supervision of the bottling process upon themselves with conscientious care, as a matter of primary importance. Every bottle is filled with the most scrupulous precautions under the direct supervision of the authorities; and the peculiar trademark which appears on every bottle filled at Carlsbad — is a certain guarantee of its genuineness and medicinal efficacy. Each bottle (glass) holds exactly a german litre. Properly bottled, the Carlsbad water may be relied upon to keep without deterioration, loss of clearness or of any of its chemical constituents, for years, nor does the carriage affect it in any way.

The bottled water may be used with benefit in every case in which the Carlsbad treatment is indicated, when the presence of the patient on the spot is not convenient; for instance, for a course in winter, or else as a preparation for the ordinary course at the baths, or as a continuation of it. *The water may be taken either hot or cold. Taken cold, it acts more specifically as a purgative*, and on this account cold doses are advisable wherever purging and a clearing of the bowels are more particularly desired — as, for instance with persons of a plethoric habit, subject to chronic constipation, and in this form it is above all things beneficial as a preparation for the ordinary course of *warm* water

6,673 fl. p. a. (from 1845 to 1849); during the following six years the town took the sale into its own hands; from 1857 to 1866 the trade was again let out to contractors viz., Knoll and Mattoni for 6,050 fl.; then for nine years to H. Mattoni for 14,000 fl.; from 1877 to 1886 to Löbel Schottländer, from Breslau, for 70,000 fl., and from the 1st January 1887, during 15 years, to the same Company for 175,000 fl. per annum.

taken at the baths, and the main object of which is *not* by any means mere purging.

If the water is taken hot, either the whole bottle should be immersed in warm water, which is gradually heated according to requirements as a bain-Marie or else each separate tumbler may by dealt with in this way. If the whole bottle is heated, it should first be uncorked and the cork placed loosely on its mouth.

As the water is readily absorbed by an empty stomach, the hour of rising is in most cases by far the best time for taking it. For the same reason the last meal of the preceding day ought to be neither heavy nor taken very late. There are cases to which the rule of taking all the water before breakfast does not apply. Some persons, for instance, are able only to digest small quantities at a time. Such will find it preferable to divide the dose and take only part before breakfast, and the remainder between breakfast and lunch or dinner. In any case the water ought to be taken in sips, one mouthful at a time, and with small intervals intervening between each two sips. It suits some people better to take the water sitting or resting, with others it has a better effect if accompanied by moderate exercise and in the open air. Whether taken resting or walking, no second dose — say: a tumblerful — should succeed the first at a shorter period than a quarter of an hour and twice that period ought to elapse between the last dose and breakfast. If a quarter of an hour should prove insufficient, a longer time ought to be allowed to pass.

As regards diet, a good deal is said about a specific Carlsbad diet! In reality there is no such

thing as a specific Carlsbad diet at all. It is not the water, it is the particular ailment which compels a particular diet.

But, speaking generally, the following may be taken as firm rules for patients: — The meals consumed should be as plain in composition, and as moderate in quantity as can be managed, more especially the evening meal. Anything heavy, rich or fat spiced or smoked meats, large doses of sweets, moreover strong beer — all these ought to be carefully avoided. Wine should be taken only in moderation and the same restrictive rule applied to other alcoholic drinks. Diabetic patients as a matter of course should observe their specific diabetic diet. Smoking should be kept within moderate bounds. Plenty of out-door exercise and bathing, both add naturally to the effect of the waters. But excessive exertion, alike of body and of mind, ought to be carefully avoided. Baths of course should be taken only if otherwise agreeing with the patient. The diet here sketched in rough outline should be observed for some time after the course of treatment is over. As for the proper length of that course only a physician acquainted with the constitution of the patient and observing the symptoms can form a judgment on that point.

The Natural Carlsbad Sprudel Salts.

Although the time when the Sprudel salts were first prepared can be traced back to the year 1708, yet the merit of having, by indefatigable activity, firmly established the reputation of the Carlsbad Sprudel salts is almost entirely due to Dr. David

1. Spruidel Salt Works. 2. Kettle-house. 3. Evaporation. 4. Crystallisation. 5. Refining.

1. Packing Hall. 2. Dry evaporation. 3. Carbonization. 4. Drying rooms. 5. Pulverization.

Becher*), and, thanks to his influence, the salts were, in 1764, prepared on a large scale, and the manufacture of these as a municipal enterprise was then taken up by the head of the town. Dr. David Becher's method of evaporation based upon the action of the heat naturally inherent in the Sprudel waters, possessed the recommendation of extraordinary cheapness, and yielded in 1788 as much as five quintals of Sprudel salt (= 620 English pounds).

Dr. Becher's first Sprudelsalt-preparation.

The crystallized Salts prepared according to Dr. Becher's method consisted mainly of crystallized sodic sulphate and that by the very desire of Dr. Becher himself, who did not by any means intend to produce a preparation containing all the soluble ingredients of Sprudel water and designed to act as a complete substitute. All that he aimed at was to produce a salt which might be added to the thermal water and so to augment its action.

*) E. Ludwig über das Karlsbader Sprudelsalz. Wiener medicinische Blätter 1880 No. 50, 1881 No. 1, 2, 4 u. 5.

Owing to its excellent qualities the preparation rapidly made its way into public favour, and the demand rose to such a height that in 1868 the production on the old scale was altogether inadequate, even though the annual yield had increased to 60 hundredweights.

Then the town erected new salt works.

But in 1878 the demand once more so far outstripped the available supply that orders could not be executed, and a further enlargement of the works was found indispensable. This enlargement was effected by the erection, at the expense of the municipality, of additional buildings provided with improved appliances for evaporation by steam, after the plans of Dr. A. Frank of Charlottenburg (Berlin).

The Natural Carlsbad Sprudel Salt, obtained by evaporation and crystallization after Dr. Becher's method, forms clear white crystals of a rather salty bitter taste and of alkaline reaction.

This crystallized Carlsbad Sprudel Salt dissolves in its own water of crystallization at as low a temperature as 31·0 C. (= 25 0 R. = 88·0 F.) and must therefore be kept in a cool place. This makes it less convenient for keeping, but is does not otherwise interfere with the effectiveness of the salt. This salt should also be kept in a well corked bottle, because when freely exposed to the atmosphere it is apt to lose its water of crystallization and do dry up to a white powder.

The Natural Carlsbad Sprudel Salt in its *crystallized* form contains, according to Ragsky: —

Sulphate of Soda	37·695	per cent.
Chloride of Sodium	0·397	„
Carbonate of Soda	5·997	„
Sulphate of Potash	traces.	
Water of crystallization	55·520	„

The Natural Carlsbad Sprudel Salt *crystallized* the old form of Carlsbad salt, is an antacid, slightly laxative and diuretic remedy and, if taken in larger doses one to two teaspoonsful, acts as a gentle but effective purgative. It dissolves more readily in warm water than in cold, and in a warm solution its effect is also more to be relied upon. For this reason it is best taken dissolved in water of from 100 to 132 degrees Fahrenheit, though it may also be taken cold. The Sprudel Salt is best taken on an empty stomach, the first thing in the morning. When used to increase the action of the Carlsbad springs, it is best dissolved in a tumblerful of the mineral water. When dissolved in hard water the solution becomes turbid, but this does not interfere with its effect.

The Natural Carlsbad Sprudel Salt in powderform.

As soon as the Carlsbad Sprudel Salts became an article in considerable demand, they were as a matter of course, frequently analyzed, and in course of time adverse criticisms were passed upon them by chemists like Almen*), Uloth**) and Harnack***), who proceeded upon the wholly false assumption that the crystallized Salts were meant as a substitute of and full equivalent for the natural thermal water.

This was not at all what had been intended. However at the instance of various physicians and pharmaceutists, a commission of experts was appointed and met at Carlsbad in 1880 consisting of Prof. E. Ludwig of Vienna, Dr. A. Frank of Charlotten-

*) Fehling. Neues Handwörterbuch d. Chemie vol. III. p. 942.
**) Fehling. Neues Handwörterbuch d. Chemie vol. III. p. 942.
***) Harnack. Berliner klinisch e Wochenschrift 1880. No. 1. p. 8.

burg, Dr. Pilz of Carlsbad and Dr. Hoffmann of Carlsbad. On their recommendation Dr. Ernst Ludwig, professor of applied medical chemistry at the University of Vienna, was invited by the town council to consider the best means of preparing a product from the Mineral water containing *all its ingredients* soluble in water. In accordance with the directions given by Professor Ludwig, the natural Carlsbad Sprudel Salt, sold in powderform — which will be considered more closely in the next chapters — is prepared in the following way. The Sprudel water is overheated. This causes it to drop a precipitate which is removed by filtration. The filtered liquid is then concentrated by evaporation until it is reduced to a residue of salt and while still moist this salt is saturated with the carbonic acid so freely given off by the Sprudel Springs. The two processes described are carried out at different stages and in different localities. The Salt is produced at the Salt works and its saturation with carbonic acid gas is effectuated in the Sprudel Hall. The object of saturation of the Salt with natural carbondioxide is to retransform the monocarbonates of Lithia and Soda, as resulting from the process of concentration into bicarbonates, thus bringing them back to exactly their original condition when still held in solution in the natural Carlsbad water. From this explanation it will be seen that the Natural Carlsbad Sprudel Salt as now prepared and sold in powderform approximates in chemical composition as nearly as possible to the Mineral water, containing all the soluble constituents of the spring as in the Sprudel water and in the same proportions and combinations (both Soda and Lithia being present as Bicarbonates).

The Natural Carlsbad Sprudel Salt (powder), prepared since 1882, according to the method recommended by Prof. E. Ludwig of Vienna, is a white powder of a mild, somewhat salty-bitterish taste.

It is preferable to the other (crystallized) also on this ground, that it is not deliquescent in warm weather, *it is also more palatable than the crystal salt.*

Its composition, according to Prof. E. Ludwig, is as follows: —

Carbonate of Lithia	0·20	per cent
Bicarbonate of Soda	36·11	„
Sulphate of Potash	3·31	„
Sulphate of Soda	41·62	„
Chloride of Sodium	18·19	„
Fluoride of Sodium	traces	
Borate of Soda	0·03	„
Anhydride of Silicic Acid, Oxyde of Iron, Lime and Magnesia	traces	
Moisture	0·44	„

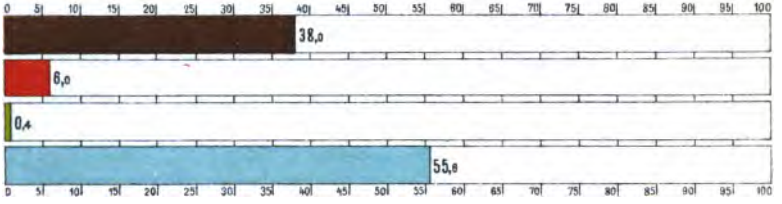
Accordingly it is the very best substitute obtainable for the natural water. Only the useless earthy carbonates (manganese, lime, iron, magnesia) and silicic acid are absent. It is a triumph of modern chemistry to be able to yield such a preparation. If by any chance it should happen that the salt thus obtained does not show upon analysis to contain the exact proportion of such constituent, then the product is thrown back into the Sprudel water and the whole process is gone over again.

By these means purchasers are assured of the proper composition of the article which they buy. To show how very conscientiously the town acts in preparing this fine modern product we cite below some analyses made by various chemists, independently, at different places, and at different times, and, of course, of different samples: —

The Natural Carlsbad Sprudelsalt, crystallized

contains according to Ragsky in 100 parts:

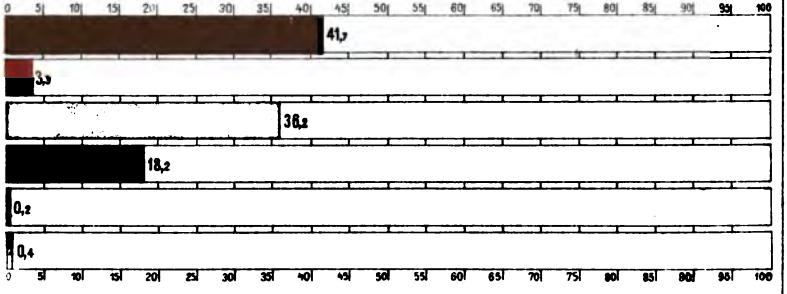
Sulphate of Soda . . = Na_2SO_4
Carbonate of Soda . . = Na_2CO_3
Chloride of Sodium . = $NaCl$
Water of crystallization H_2O



The Natural Carlsbad Sprudelsalt, powder

contains according to E. Ludwig in 100 parts:

Sulphate of Soda . . = Na_2SO_4
Sulphate of Potash . = K_2SO_4
Bicarbonate of Soda . = $NaHCO_3$
Chloride of Sodium . = $NaCl$
Carbonate of lithia . = Li_2CO_3
Water . . . . . = H_2O



1. Found by calculation	2. Detected by Analysis			
	Prof. Harnack, (Halle.)	Prof. Geisler, (Dresden.)	Dr. Sipöcz, (Carlsbad.)	Prof. Ludwig, (Vienna.)
Bicarbonate of Soda 36·34 .	36·19	34·97	35·70	36·21 pr. ct.
Chloride of Sodium 18·16 .	17·24	17·94	17·45	18·19 „ „
Sulphate of Soda and of Potash 45·28 . . .	46·09	46.82	46·82	44·93 „ „

As one liter of Sprudel water yields about 5½ grammes of Sprudel Salt in powderform = one teaspoonful 5 grammes (the normal dose) of the Natural Carlsbad Sprudel Salt (powder) will contain:

Carbonate of Lithia	0.010	grammes,
Bicarbonate of Soda	1·807	„
Sulphate of Potash	0·166	„
Sulphate of Soda	2·083	„
Chloride of Sodium	0·910	„
Fluoride of Sodium	traces	
Borate of Soda	0·002	„
Anhydride of Silicic Acid, Oxide of Iron, Lime and Magnesia	traces	
Moisture	0·002	„

Considering the large yield of the Sprudel Springs (2000 liters per minute), the production of the Carlsbad Sprudel Salt might be raised, if there is no loss, to something like 10·000 kilos per day. When the further extensions of the building now in progress is completed, it will be possible to increase the production to very nearly 100·000 Kilos = 220·750 lbs of the salts per annum.

The Natural Carlsbad Sprudel Salts (both crystallized and powder) are put upon the European Continental Market in square glass-bottles containing 125 and 250 grammes and for Transatlantic Export in round glass-bottles of 100 or

200 grammes each. All such bottles have the Trade Mark both on the label and on the strip of paper surrounding the neck of the bottle and bear in addition the Signature of the

Karlsbader Mineralwasser-Versendung
Löbel Schottländer Carlsbad, Austria.

(Crystallized). (Powder).

Original Labels of the exported Nat. Carlsbad Sprudelsalts (printed only in black).

The Carlsbad Sprudel Lozenges, prepared from the Sprudel salt with the addition of sugar, are used as a good remedy against excessive acidity in the stomach (but not in all cases), for eructations, heartburn etc. They are sold in boxes each containing 24 and 44 lozenges.

The Carlsbad Sprudel Lye and the Carlsbad Sprudel Lye Salts are obtained as additional products in the preparation of the crystalline Sprudel salt, and used as an addition to baths. The lye is exported in bottles of 1 Liter (= 1 3/4 pint); the lye salt is sold in boxes of 1 kilo (2 lbs 3 oz).

The Carlsbad Sprudel Soap, prepared by addition of Carlsbad Sprudel Salt to cocoa-nut oil, is used for washing and bathing.

How to use the Natural Carlsbad Sprudel Salt in powderform.

Whereas the crystallized Sprudel Salt, obtained by Dr. Becher's*) simple method of evaporation, is on account of its large proportion of sulphate, principally used as a purgative, the Carlsbad Sprudel Salt in Powderform, prepared after Professor Ludwig's method — although likewise purgative and strengthening to the stomach, is more commonly taken as a substitute to the natural Carlsbad Mineral Water, whenever that water cannot conveniently be used — or as a useful addition to the Mineral Water. As the result of Dr. W. Jaworski's minute clinical experiments, performed on a large scale, both on healthy people and on patients, the following may be said in explanation of the therapeutical effects of the Carlsbad Sprudel Salt in powderform.

The physiological action of the Natural Carlsbad Sprudel Salt in powderform.

Dr. Jaworski's experiments have shewn that if medium doses (5—10 grammes = one to two teaspoonsful) of the powder, dissolved in a tumblerful of water, are introduced in a normal stomach, or one very nearly normal, the first effect is to neutralize the acid gastric juice, which loses its effective power for a brief time.

At the same time the mucus becomes liquified and other morphotic elements as well such as zymotic organisms assume a half soaked, swollen appearance and become suspended in the liquid contents of the stomach. Then, within the very first fifteen minutes the salt shows itself a powerful stimulant, exciting both the mechanical and the chemical functions of the whole length of the intestinal canal.

*) E. Ludwig. Ueber das Karlsbader Sprudelsalz. Wiener medicinische Blätter. 1880 No. 150, 1881 No. 1, 2, 4, 5.

The stimulated *mechanical* activity of the stomach displays itself by propulsion of the salt solution into the bowels. The motions of the stomach are soon followed by peristaltic movements in those organs, evidenced by internal rumbling and the escape of intestinal gases. The intestinal peristaltis increases more and more, it provokes a desire to evacuate and before long the normal result is a clearing of the lowest part of the intestinal canal. The further the Salt solution is carried into the bowels, the stronger and more intense also becomes the impulse for intestinal motion, the more also do the fluid and gaseous contents, intermingled with salt solution become accumulated in the colon, to be gradually evacuated in the form of a liquid stool, highly colored with bile and often emitting a penetrating smell.

Supposing large doses of the salt to have been taken, this first motion is soon to be followed by other liquid stools, originating from the upper portion of the intestinal canal. The *chemical* activity of the bowels, excited by the salts, keep pace with the *mechanical* process. It shows itself more particularly in the upper portions and is evidenced in a *profuse secretion* of *gastric juice* and *bile*. A more abundant acid secretion then sets in, which is kept latent by the action of the alcalies (the first stage) until the latter are neutralized by the continually secreted acid. This, as a rule, occurs about half an hour after 10 grammes = two teaspoonsful of the salt have been taken. After that the acid secretion increases steadily (this is called the stage of excitation) owing to the stimulation, exercised by the remaining portion of the Salts still contained in the stomach — however small their quantity. After a certain time the acid secretion reaches its climax, which is more quickly reached after 5 grammes = one teaspoonful than after 10 = two teaspoonsful. Then the acidity decreases

taking less time to do so than it did to increase (this is called the stage of recrudescence). The powder has a marked stimulating effect also upon the duodenum and the bile-ducts. It reaches the duodenum within the first quarter of an hour after taking and by that time the bile will be found to be flowing freely and for the most part to be passing downward into the stools. Synchronically with this stimulation of the mechanical and chemical action of the stomach, bowels and liver, the absorption of the ingredients of the Salt solution keeps pace likewise. The *sulphates* disappear from the stomach in 1—1½ hour from the time of taking and are ejected in a liquid stool. The *carbonates* are not found in the motions, but may be traced after an hour or less in the urine which they alcalinise, so that the bicarbonate of Soda must be considered as the ingredient of the Sprudel Salt Powder which is absorbed in the greatest quantity.

Apart from the alcalinisation of the urine there is also an increase of diuresis noticeable which continues for more than a day, after the salt is taken. Small doses of Carlsbad Sprudel Salt, up to 5 grammes = one teaspoonful, have a stimulating action on the upper parts of the digestive canal. Large doses, over 10 grammes = 2 teaspoonsful arouse strongly the lower parts. Small doses when taken for some time, increase the secretion of the gastric juice. After a longer use of large quantities (over 15 grammes = three teaspoonsful) however it is lessened by oxhaustion of the glandular apparatus.

With regard to the question, how to use the Carlsbad Sprudel Salt Powder, the following have been shewn as safe general rules by the experiments mentioned.

1. Application "per os". The most rational time for taking the Salt is in the morning, on an empty stomach, immediately after awaking. In diseases of

the stomach and bowels this is certainly the most appropriate time. For in the early hours of the day the Salt has a chance of developing its full action on the inactive organ without other influences interfering. In diseases of more remote organs too the morning is generally the most suitable time. At that period the salts are most readily absorbed and carried into the bloodvessels, and there is little fear of abnormal changes occuring the intestinal canal.

When the salt is taken on a full stomach, during digestion, even in a medium dose, the food is propelled into the lower bowels in an undigested state and is there sure to cause irritation and pain. In order to produce an active effect on a full stomach a double dose will generally prove necessary, as compared with what is sufficient on an empty stomach. If, however, the salt has to be taken during the day, an hour or two before the next meal will be the best time.

Proper doses of the Natural Carlsbad Sprudel Salt in powderform.

A single small dose of the salt is 2—5 grammes, being about as much as will lie on the point of a knife up to a teaspoonful, a medium dose is 5—10 grammes = 1 to 2 teaspoonsful, and a large dose 15 grammes = 3 teaspoonsful. As a rule one teaspoonful, dissolved in a tumblerful of water should prove sufficient. This dose reaches a concentration of about 2 percent.

That is about the right proportion, and certainly the proportion of salt should not rise beyond 5 percent of the water. Medium or large doses shall be divided into two or three small ones, fore one single larger dose would demand either a larger quantity of liquid than could be conveniently swallowed or else would reach the stomach in too concentrated a solution.

How to dissolve the Salt in powderform.

The Sprudel Salt (Powderform) is as a rule, taken dissolved in plain water. If the water is hard, the solution soon becomes turbid, and the same remark applies to mineral water. But this turbidity does not in any way interfere with the action of the salt. The salt may also be taken undissolved or rolled up in a wafer, but in that case a proportionate amount of water shoult be taken immediately after.

The best vehicle for dissolving the Carlsbad Sprudel Salt, as adding to its effectiveness is the bottled Carlsbad mineral water.

A cold solution of Sprudel Salt is best made by placing the salt in a tumbler, pouring warm water over it so as to fill about one quarter of the tumbler and assist the process of solution by stirring.

After the liquid is cooled and immediately before it is taken, the tumbler may then be filled up with cold water. A tepid solution ought to indicate about 97° F. and a warm one 112—130° F. The purgative action of the Salt is, as a rule, less shown in a warm solution than in a cold. If the salt be taken warm, it should not be first dissolved in cold water and then heated afterwards to the required point, otherwise the sodic bicarbonate would be changed into alcaline monocarbonate which is much less readily absorbed. But the salt should be at once introduced into water of the desired temperature.

How long to wait between each two doses.

If more than one dose of Sprudel Salt powder be taken, a certain interval should elapse between the several doses. The length of this interval had best be regulated by the physician consulted. It is dependant upon the following facts.

The immediate action of the alcalies of a 5 grammes dose = one teaspoonful of Sprudel Salt (powderform) lasts not quite three quarters of an hour, for in the

third quarter they are neutralized by the acid of the gastric juice.

Each following dose remains longer in the stomach than the preceding one. As it is important in stomach diseases that the salt should maintain its action as long as possible the intervals between drinking ought to be longer in cases in which the stomach more specifically is affected, extending to about three quarters of an hour. In most of the cases stated below an interval of half an hour between two doses of 5 grammes each (= each time one teaspoonful) will be found sufficient. When 15 grammes are taken in three single doses of 5 grammes (each time one teaspoonful) the first interval ought to be ½ hour, the second being protracted up to ¾ hour. If a *quick action* be desired, it will be advisable to shorten the first interval to about ¼ hour.

How soon after the Carlsbad Sprudel Salt powderform ought breakfast to be taken?

It has already been said that it is desirable that the salt should continue its action as long as possible without interruption. This cannot be the case, if the intestinal canal is forced by food being taken while the salt is still at work to begin its digestive action and if the salt solution, thus becoming intermingled with food has its chemical condition changed. The time which should elapse before breakfast must of course differ according to the dose taken and the particular conditions of the patient. The patient may however be guided by the arising sensation of hunger.

The Sprudel Salt Powder used for washing out the stomach (lavage).

For washing out the stomach a solution of the Sprudel Salt should be used prepared by dissolving 2 to 3 teaspoonsful in 2—3 litres of common water. The solutions should be about blood-heat and used

late in the evening. For in that way the stomach is relieved of its contents, which would otherwise irritate the mucous membrane of the stomach throughout the night and weaken it. By not taking any food after the washing, 12 hours of complete rest are secured for the sick organ. It is stopped for working and may derive the full benefit of the action of the washing and of the salt remaining in the stomach.

Application of the Carlsbad Sprudel Salt powderform by injection.

If it is desired to apply the salt in the shape of an enema, two or three tablespoonsful of the powder or more, if necessary, should be dissolved in about 2 litres of ordinary water having a temperature of about 104° F. As larger quantities of the Salt can be introduced into the blood-vessels of the abdominal and pelvical organs than is possible by taking the Salt as a draught, it is a good plan, in affections of these organs, to divide the dose to be taken so as to imbibe half by the mouth and have the other half injected by the rectum.

Therapeutical effect of the Natural Carlsbad Sprudelsalt Powderform in various disorders.

The clinical experiments referred to above (page 51) have shewn the Sprudel Salt Powder to be of satisfactory therapeutical effect in the following disorders:

1. In all cases of morbidly increased secretion of the gastric juice — catarrhus acidus (Jaworski) — it is according to use medium doses and if the hypersecretion be excessive even larger doses for a protracted period.

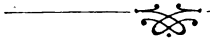
   If the increased acid secretion is combined with atonia or moderate distension of the stomach, it will be well to apply the Carlsbad Sprudel Salt (powderform) dissolved in Carlsbad mineral water.

2. In insufficient acid secretion of the stomach small doses, at the utmost 5 grammes, are very effectivc taken in carbonized water.
3. Acute gastritis is generally corrected by small doses of Carlsbad Sprudel Salt in powderform, taken in cold solution, early in the morning on an empty stomach and leaves an excellent appetite. Dyspepsia acquired by overloading the stomach (dyspepsia ab ingestis) requires larger doses.
4. In the treatment of ulcer of the Stomach the Salt has long been recommended, very warmly so by v. Ziemsen and Leube. In the earliest stage of the treatment one teaspoonful of the salt should be dissolved in ½ litre of tepid water and taken in three portions. The excellent action of the Carlsbad Sprudel Salt in powderform in ulcers of the stomach is explained by the fact, that this trouble is in most cases accompanied by increased acid secretion and acid catarrh of the stomach.
5. For washing out the stomach in cases of distension of the stomach, accompanied by a feeling of weakness or exhaustion the Sprudel Salt has proved exceedingly effective.
6. As an occasional purgative the Carlsbad Sprudel Salt (powderform) ranks among the most serviceable medicines. The dose should vary according to the individual, 5—10 grammes = one to two teaspoonsful being the usual quantity.
7. In habitual constipation the quantity to be taken for a systematical course of treatment should not exceed 10 grammes = 2 teaspoonsful. If one is compelled to take refuge to larger doses, it is best to take it in Carlsbad water or in an acidulous mineral water.

8. In mucous catarrh of the intestine, accompanied by a tendency to constipation and coprostasis, the Carlsbad Sprudel Salt Powder is used to advantage in doses up to 10 grammes = 2 teaspoonsful. In some cases the treatment may be assisted by an enema holding 1 to 3 percents of the Salt.
9. In Icterus catarrhalis the Carlsbad Sprudel Salt (powderform) should be used in larger doses and in a warm solution (122—144°) F. at least for a fortnight.
10. For treatment of Cholelithiasis and a tendency to gall-stones the reader is referred to what has been said under the head of Icterus catarrhalis. The same application of the salt will be found of service.
11. In fatty enlargment of the liver and in the primary stage of liver-cirrhosis the Carlsbad Sprudel Salt (powderform) in doses up to 10 grammes = 2 teaspoonsful is a successful means of meeting the indication to augment the bloodcirculation in the portal system and also the flow of gall.
12. In general obesity the Carlsbad Sprudel Salt (powderform) is best used in larger doses, 10—20 grammes per day, in tepid solutions. But a strengthening diet should accompany this treatment or the patient will find himself too much debilitated.
13. In diabetes mellitus in which the Carlsbad water, in most cases, stops the secretion of sugar, good results have been obtained by the use of the Carlsbad Sprudel Salt Powder. The Salt should be taken in a very weak solution, one teaspoonful only to a litre of water, and warm (122° F.) and the treatment must be continued for weeks with strict adherence to an antidiabetic diet. The treatment should however be stopped if there is considerable loss of weight.

14. In gout developing on the ground of Uric Acid diathesis the Carlsbad Sprudel Salt Powder should be used in a warm solution of 122° F., one teaspoonful to one litre of water daily.
15. In subacute form of Pyelitis and Cystitis, warm weak solutions of the Salt are of particular benefit on account of their diuretic action and their property of alcalinizing the urine.
16. It ought still to be mentioned that systematic injections, on a large scale, of solutions of 1 percent Sprudel Salt in powderform at 122° F. have proved exceedingly efficacious in cases of Amenorrhoea, Metritis chronica, peri- and parametritic exsudations and Perityphlitis, there having been observed a more speedy involution and reabsorption of the exsudative matters by means of the Salt Solution, which was injected in the pelvical organs.

Finally, small doses of the Sprudel Salt Powder, about as much as will lie on the point of a knife, taken several times a day, have been very efficacious taken after dinner, in abnormal production of acidity in the stomach, in certain complaints, such as heartburn, acid eructation, belchings. The salt may also be taken in the place of the peptic powder hitherto used or sodic bicarbonate, moreover in chronic diarrhoea, ½ gramme in 100 grammes = a wineglassfull of very warm water, in Uric Acid diathesis, gout, disposition to uric gravel and uric concrements and in all diseases mentioned above, where larger doses taken at one-time do not agree well, or where they act more as a purgative than is desirable.



Orders for Carlsbad Thermal Waters, for Carlsbad Sprudel Salts and other Products of the Springs should always be addressed to the

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MINERALWASSER-VERSENDUNG
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LIST OF PHYSICIANS OF CARLSBAD.

The order in which they began practising in the City.

Doctor DE HOCHBERGER (1830).
" STARK (1858).
" SCHNEE (1864).
" NEUBAUER (1867).
" MAYER (1869).
" J. KRAUS (1870).
" KAFKA (1871).
" GRÜNBERGER (1872).
" LÖWENSTEIN (1874).
" LANG (1874). [(1874).
" SZTANKOVÁNSZKY
" HASSEWICZ (1875).
" PLESCHNER (1875).
" LONDON (1876).
" HERZTKA (1877).
" MLADY (1877).
" CARTELLIERI (1877).
" ROSENZWEIG (1877).
" FRIEDENTHAL (1879).
" HOFMEISTER (1880).
" KÁLLAY (1881).
" FREUND (1881).
" GANS (1881).
" S. HIRSCH (1882).
" LÖWY (1882).
" STICHE (1882).
" SELIGMANN (1882).
" KRETOWICZ (1884).
" A. HERRMANN(1884).
" KLEEN (1884),
" BAYER (1884).
" BECHER (1885).
" RUFF (1885). [(1885).
" SCHUMAN-LECLERCQ
" STRUNZ (1886).
" HOCHBERGER jne. (1886).
" POLLATSCHEK (1886).
" POLLITZER (1887).
" RITTER (1887).
" PREISS (1887).
" PADOWETZ (1887).

Doctor O. KRAUS (1889).
" E. HIRSCH (1889).
" ERÉNYI (1889).
" AHNELT (1890).
" HOFFMANN (1890).
" TUGENDHAT (1890).
" REICHEL (1891).
" POPPER (1891).
" KLEMPERER (1891).
" TYRNAUER (1892).
" SPITZER (1892).
" NAGL (1892).
" ENGEL (1892).
" FRANK (1892).
" GLASER (1892).
" C. HERMANN (1892).
" WALLISCH (1892).
" MERA (1893).
" MUNK (1893).
" ÖSTREICHER (1893).
" NEUSTADL (1893).
" FINK (1893).
" KUGLER (1893).
" BERNHARTH (1893).
" R.HOFMEISTER(1893).
" MÜLLER (1893).
" STEIDL (1894).
" FISCHER (1894).
" ZATLOUKAL (1894).
" TOEPFER (1894).
" BRANDEISZ (1894).
" TAUSSIG (1894).
" J. HIRSCH (1894).
" SAMISCH (1894).
" LORÁND (1894).
" FRIEDLÄNDER (1895).
" AUSTERLITZ (1895).
" RÜLING (1895).
" KURY (1895).
" GINTL (1895).
" F. KRAUS jne. (1895).
" LEBOVICI (1895).
" GROSS (1895).